



# Produced Water Fit-for Purpose Reuse Research Public Education and Outreach Workshop

**NMSU Carlsbad Campus  
November 9, 2021**



**BE BOLD. Shape the Future.**

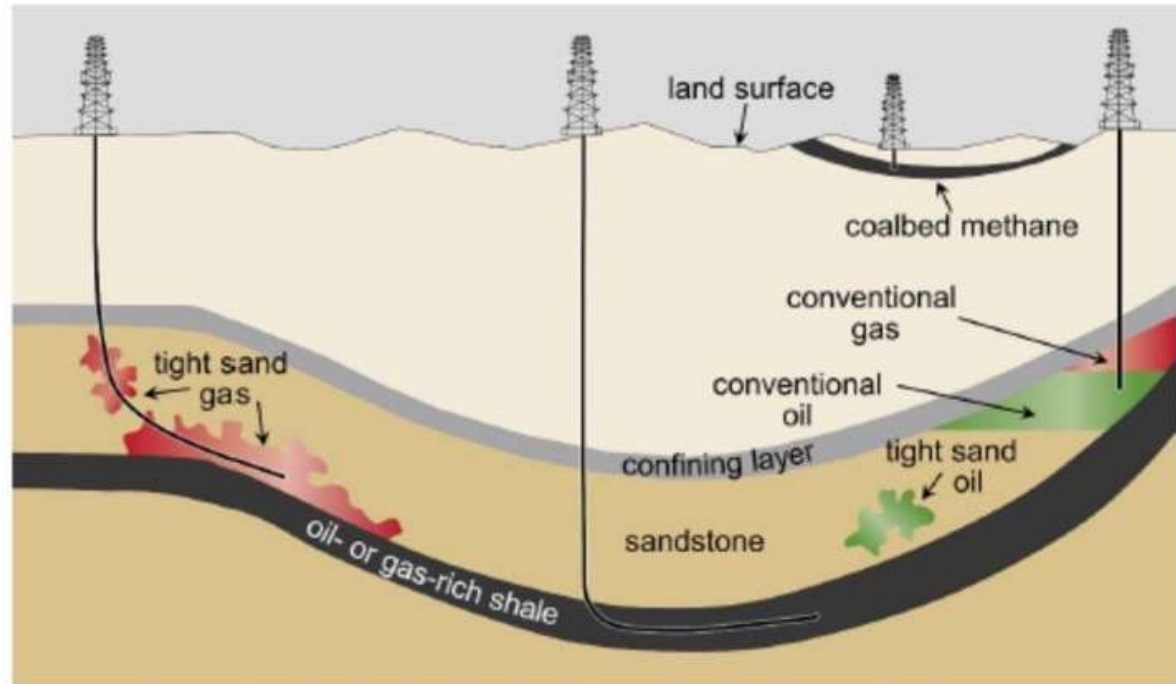
**NEW MEXICO PRODUCED WATER RESEARCH CONSORTIUM**

## Consortium Public Education and Outreach

- Provide information on Consortium efforts in a workshop format – technical/public dialogue, fact sheets, and handouts
- Address oil and gas terminology related to produced water and produced water reuse
- Provide information on Consortium efforts in addressing unknowns
  - Produced water chemical analysis, treatment technology performance
  - Risk and toxicology evaluation approaches
  - Training on the use of produced water analysis tools and models
- Collect information from the public on our efforts to address public health and safety concerns about chemicals, toxicology, and risk reduction for produced water reuse

## What is Produced Water

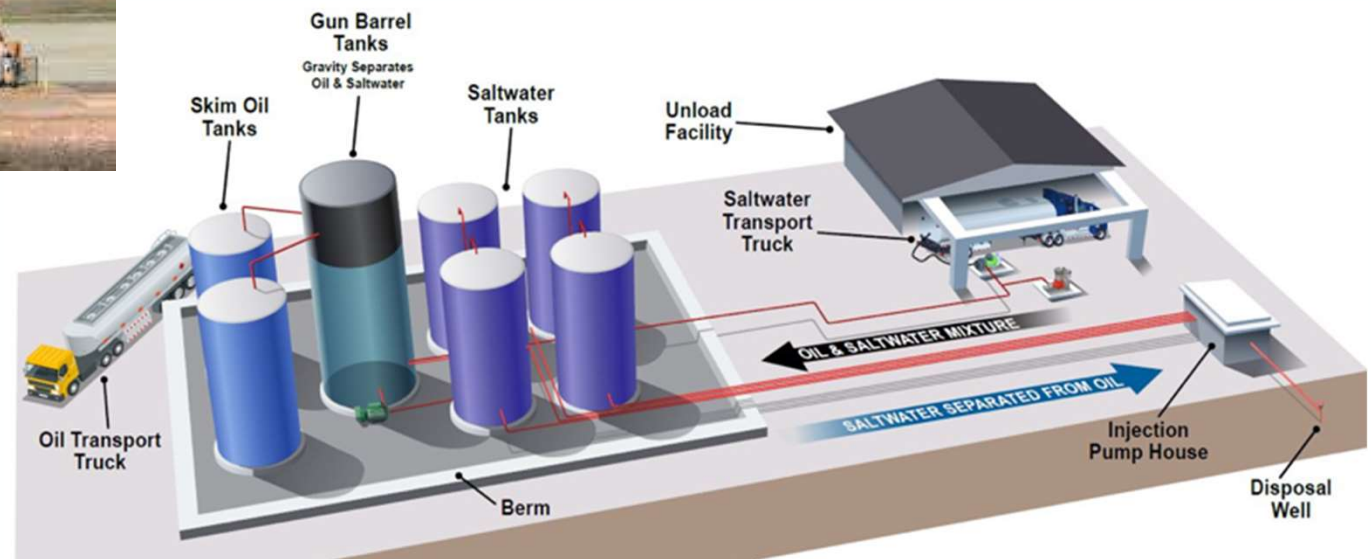
- Produced water is water produced in conjunction with oil and gas operations - drilling, development, pumping, and fracking
- Water can be 4-10 times the volume of oil produced (1 bbl oil = 4-10 bbls of water)
- Produced water often contains high levels of minerals and organic compounds due to geology and hydrocarbon contact



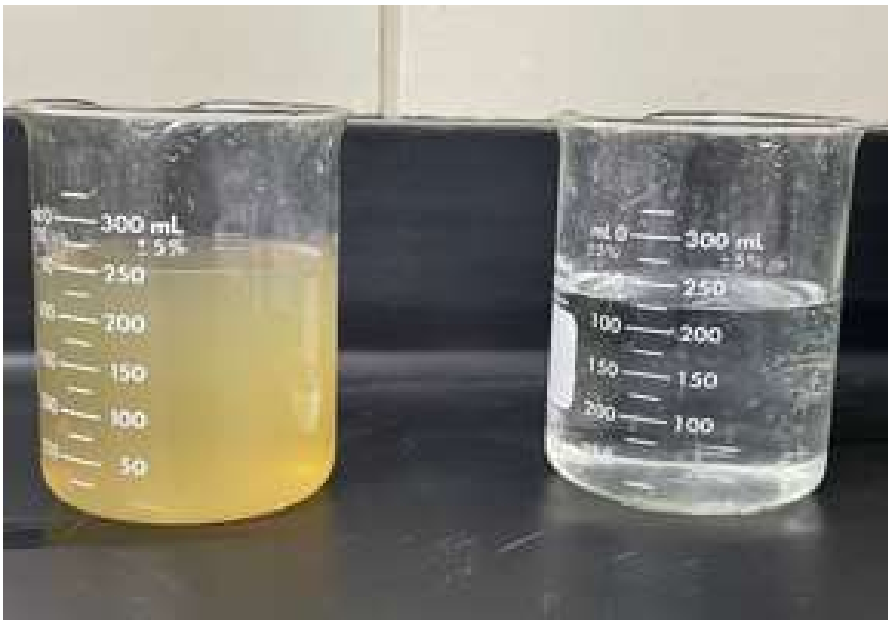
### Oil and Gas Production

All oil and gas production includes water because production is from deep ancient seas, shallow plays, or adds water

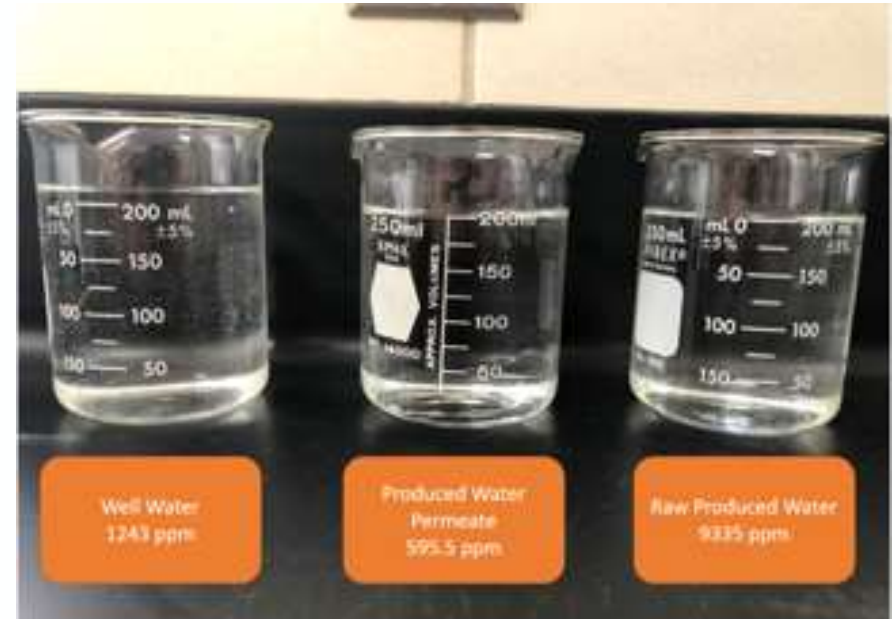
# Collection and Separation of Produced Water



## Examples of Raw and Treated NM Produced Water



Permian Basin -100,000 TDS PW (left)  
w/pre-treatment to remove oil, grease,  
suspended solids (right)

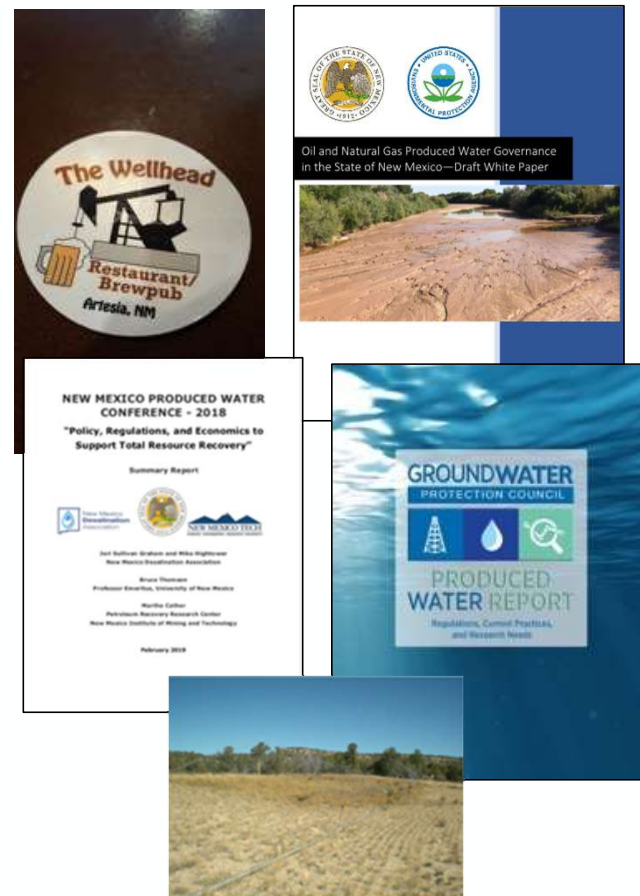


San Juan Basin -10,000 TDS PW (right)  
w/RO treatment to remove TDS (middle)  
Alamogordo Groundwater (left)



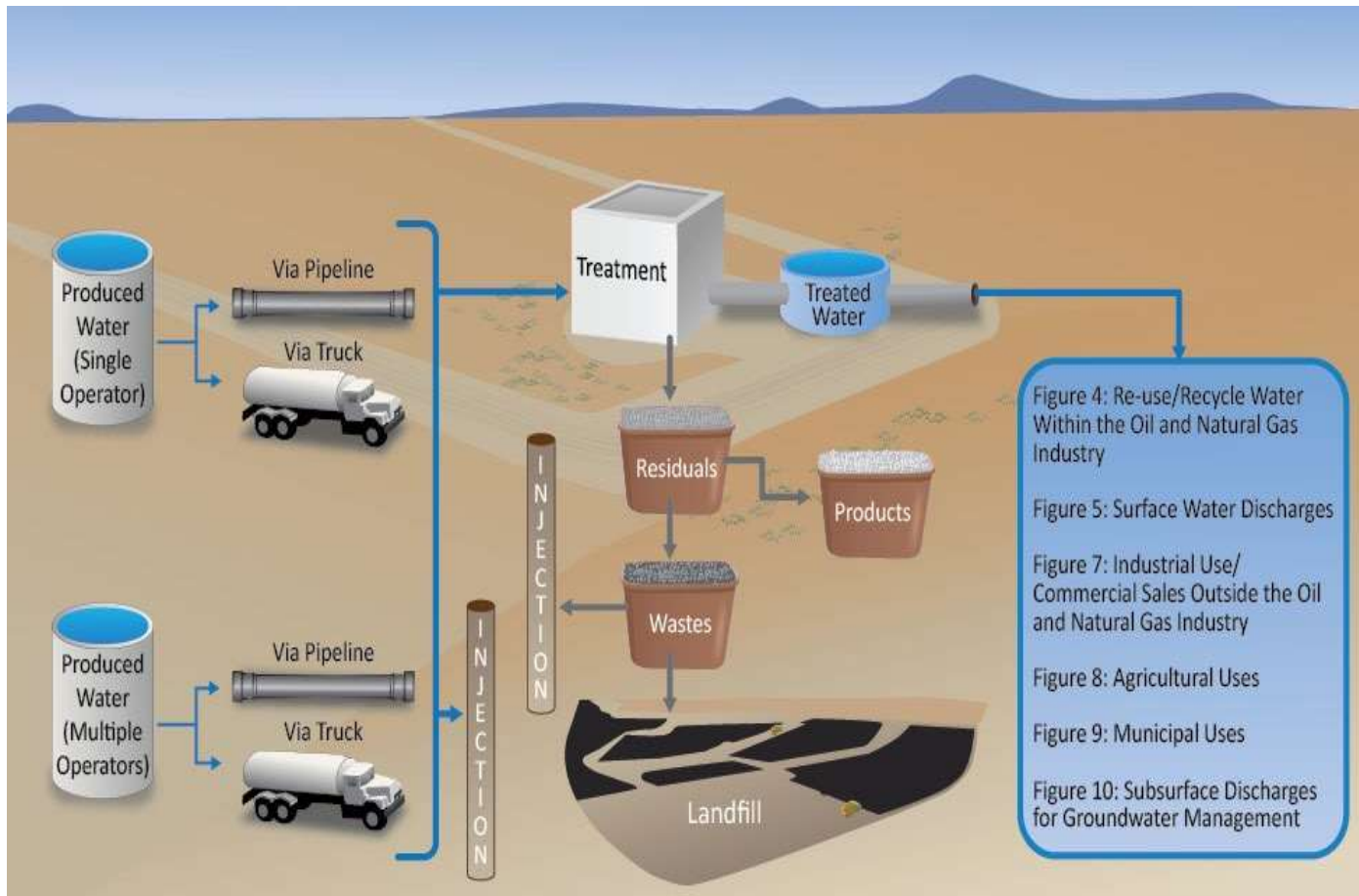
## Long History in NM on Produced Water Reuse Research

- Sandia and Los Alamos conference on CBM produced water reuse in Denver for DOE – 2002 (20 oil companies)
- Permian Produced Water Reuse Workshop at NMJC in Hobbs with NM WRRRI - 2003 (140 attendees, eight projects ongoing- Reed & Stevens, Yates, Devon, Chevron, Conoco, Sandia, LANL)
- NM Tech PRRC Produced Water Treatment Effort – 2003 -2007
- Significant industry, national lab, and university efforts - 2004-2015
- NM EMNRD working group on streamlining produced water reuse - 2015
- EPA signs MOU with NM to explore produced water reuse options - 2018
- NM Desal Association Workshop on Produced Water Reuse – 2018 (160 attendees)
- DOE and BOR expand desalination research funding to include produced water 2019



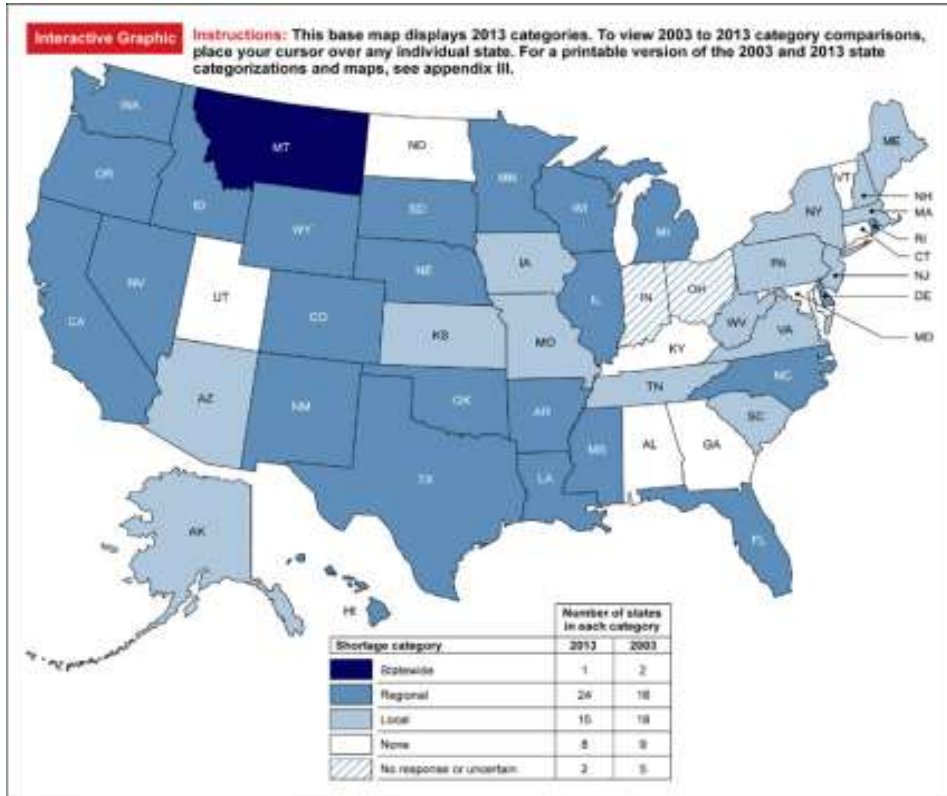
# Use of Produced Water – Today and Tomorrow

Today  
➔



Tomorrow  
←

# State Water Stress Driving Produced Water Reuse

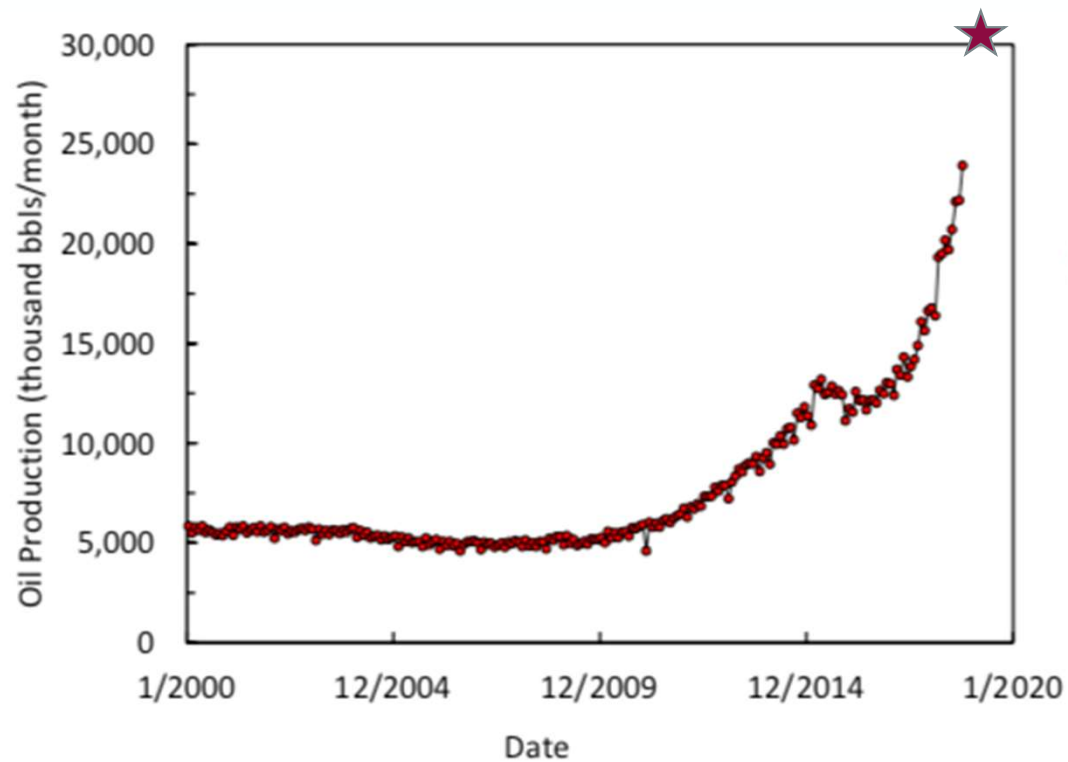


Sources: GAO analysis of state water managers' responses to GAO survey; Map Resources (map).





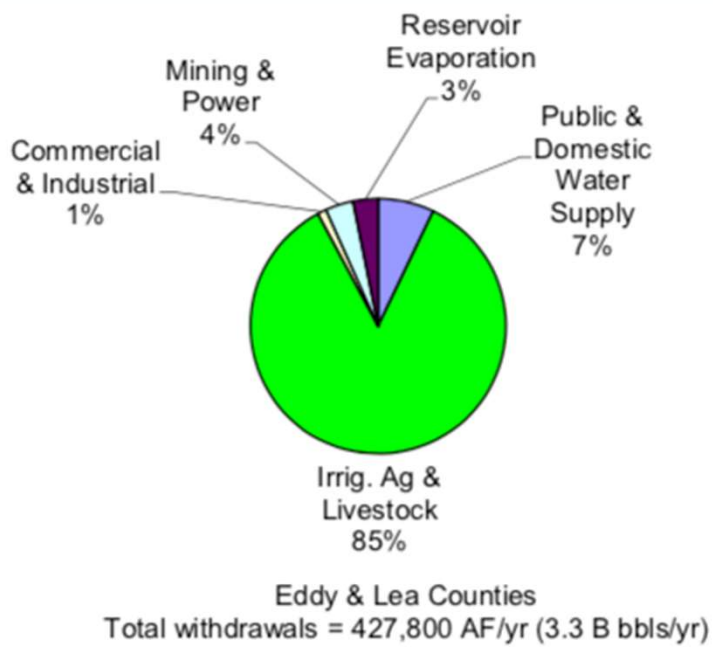
## Produced Water Volumes are Significant



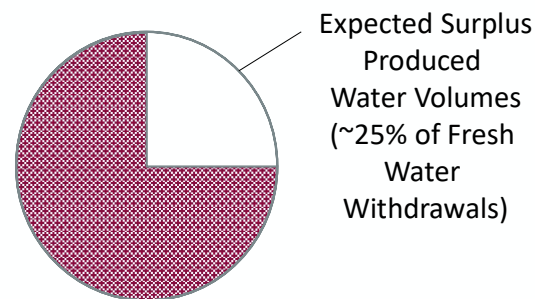
Average ~4 million bbls produced water/day (3 ABQ's worth of produced water availability)

# Water Supply Impact Of Produced Water Reuse

Potential NM Economic Impact – \$2-3 Billion per year



Annual Fresh Water Withdrawal



Surplus expected to be ~1 B bbls/yr (2-3 M bbls/day)

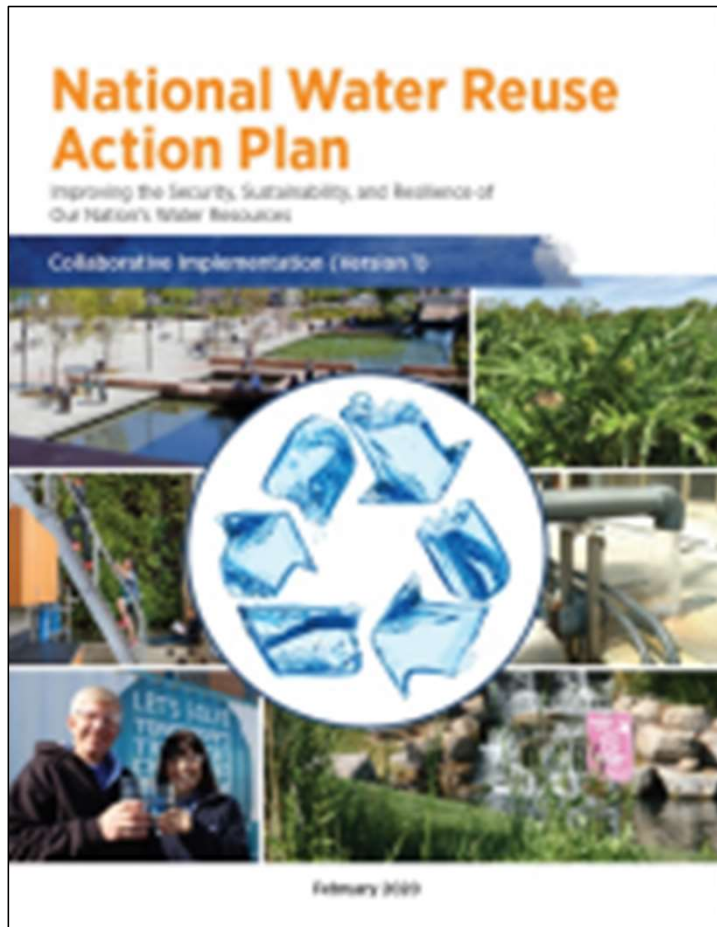
Projected Produced Water Surplus

## NM 2019 Produced Water Act

- Through the Act, statutory and regulatory authority for the reuse of produced water was modified:
  - Reuse inside oil and gas sector remains under the Oil Conservation Division (OCD) of the NM EMNRD,
  - **Reuse outside the oil and gas sector, was designated to the NM Environment Department (NMED).**
- The Act encourages produced water reuse outside oil and gas to:
  - enhance fresh water sustainability,
  - reduce or eliminate fresh water use in the oil and gas sector,
  - support new economic development opportunities,
  - maintain public and environmental health and safety.

**Emerging trend in the oil and gas sector – PA, WY, OK, TX, AZ, UT, CA**

## EPA National Water Reuse Action Plan – Feb 29, 2020



- Focus on fit-for-purpose treatment and reuse of waste water
- In five major areas:
  - Thermo-electric cooling water
  - Agricultural waste water
  - Municipal waste water
  - Produced water
  - Storm water
- EPA selected NMPWRC and GWPC to lead the national program in produced water reuse



# “Overcoming fear requires making the unknown known”

Georgia O’Keeffe

“we oppose even entertaining the idea of using this on crops.” “Because it’s chemically altered, we believe it can never be returned to the evolutionary process as water.” **NM Desal, 2018 Produced Water Forum Protestor.**

**Wash Post Dec 8, 2018**

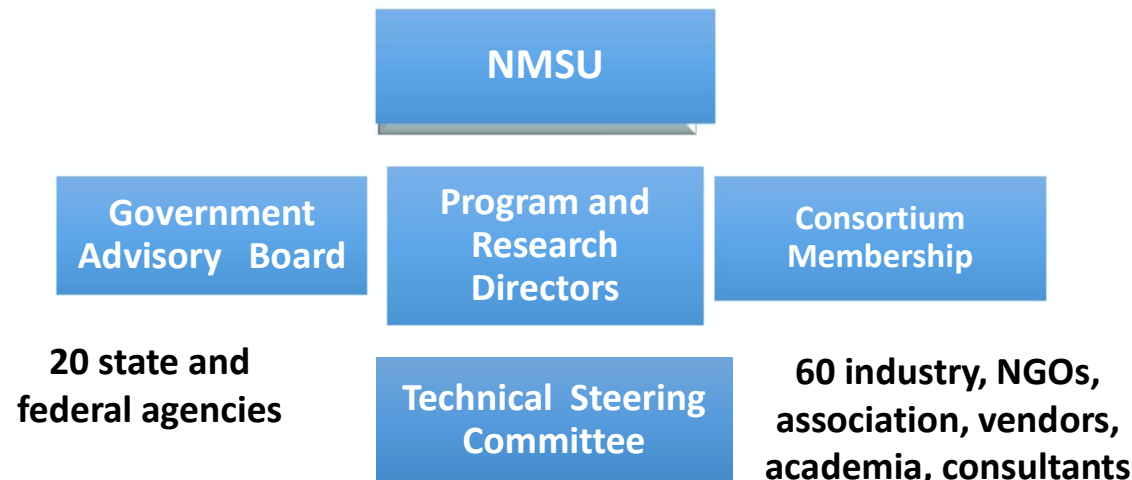
“Unknown, poisonous, and hazardous proprietary chemicals”  
**Public Meetings 2019**

“... we have been using treated waste water for 40 years, we are not afraid of it, what we want to do is protect our fresh water resources...”

**NMPWRC, NM Elected Officials Forums,  
July-August, 2021**

## NM Produced Water Research Consortium Overview

- Formed through an MOU between the NMED and NMSU
  - Support NMED and other state agencies in assessing produced water
  - Coordinate research and development of fit-for-purpose reuse of produced water outside oil and gas
- Fill science and technology gaps
  - Use collaborative process of government, industry, public
  - **Assure reuse is protective of public and environmental health and safety**
- Initial 3-year program, 2020-2022, funded by sponsorships
- Currently 80 organizations with 150 participants



Modeled after DOE and EPA  
Environmental Treatment Technology  
Verification Programs

## Consortium Education Breakout Sessions

- Present Consortium efforts to date in addressing current science and data gaps and unknowns
  - Produced water chemical analysis
  - Produced water treatment testing
  - Risk and toxicology monitoring and analysis
  - NM Produced Water Data Portal
  - Socio-economic and ecological cost benefit modeling and analysis